

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
17 June 2004 (17.06.2004)

PCT

(10) International Publication Number  
WO 2004/049777 A2

- (51) International Patent Classification: Not classified
- (21) International Application Number: PCT/US2003/040148
- (22) International Filing Date: 3 December 2003 (03.12.2003)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
60/430,954 3 December 2002 (03.12.2002) US
- (63) Related by continuation (CON) or continuation-in-part (CIP) to earlier application:  
US 60/430,954 (CIP)  
Filed on 4 December 2002 (04.12.2002)
- (71) Applicant (for all designated States except US): WASHINGTON UNIVERSITY [US/US]; A corporation of the State of Missouri, One Brookings Drive, St. Louis, MO 63130 (US).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): BAE, Kyongtae T.

[US/US]; 3 Fleetwood Drive, St. Louis, MO 63124 (US).  
KIM, Jinsung [KR/KR]; 116-33 Kwangan 1 Dong, Suyong-gu, Busan (KR).

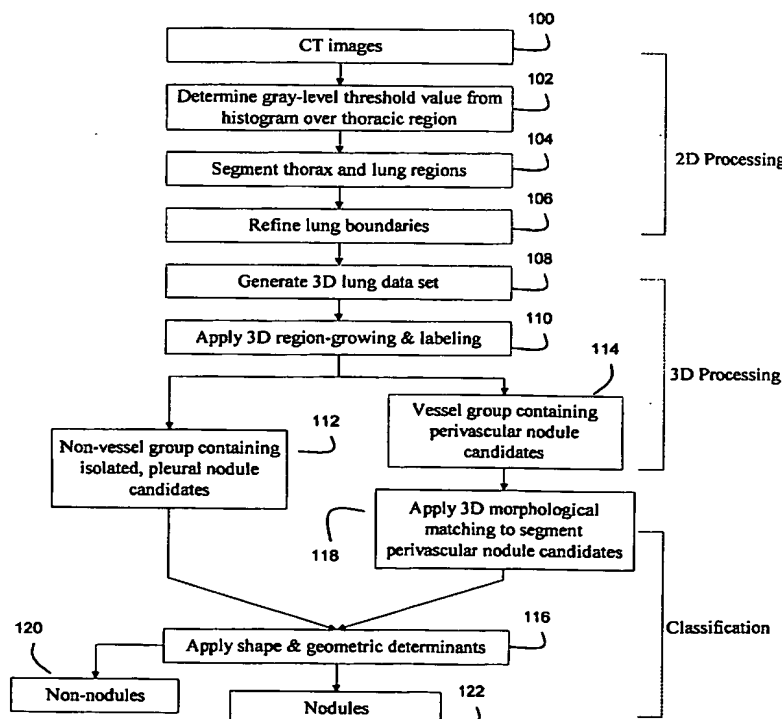
(74) Agents: VOLK, Jr., Benjamin L. et al.; Thompson Coburn LLP, One US Bank Plaza, St. Louis, MO 63101 (US).

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: METHOD AND APPARATUS FOR AUTOMATED DETECTION OF TARGET STRUCTURES FROM MEDICAL IMAGES USING A 3D MORPHOLOGICAL MATCHING ALGORITHM



(57) Abstract: A method for the automated detection of target structures shown in digital medical images, the method of comprising: (1) generating a three dimensional (3D) volumetric data set of a patient region within which the target structure resides from a plurality of segmented medical image slices; (2) grouping contiguous structures that are depicted in the 3D volumetric data set to create corresponding grouped structure data sets; (3) assigning each grouped structure data set to one of a plurality of detection algorithms, each detection algorithm being configured to detect a different type of target structure; and (4) processing each grouped structure data set according to its assigned detection algorithm to thereby detect whether any target structures are present in the medical images. Preferably, the target structures are pulmonary nodules, and a specialized detection algorithm is applied to image data classified as a candidate for depicting perivascular nodules. To segment perivascular nodule candidates from surrounding vessels, the image data is preferably correlated with a plurality of 3D morphological filters.



**Published:**

— without international search report and to be republished  
upon receipt of that report

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*